AQUARIUS/SAC-D

Aquarius Science Team - Aquarius Ground System ICD

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AQUARIUS/SAC-D

Aquarius Science Team - Aquarius Ground System ICD

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Aquarius Science Team to Aquarius Ground System ICD					
Signatory	Request Sent	Signature Rcvd	Sign off Date	Comments	Comments Integrated in Version
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DOCUMENT CHANGE LOG

Change Number	Change Date	Pages Affected	Changes/ Notes	General Comments
-	19 Jan 2011		Initial Release	

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REFERENCES & APPLICABLE **DOCUMENTS**

Nº:	TITLE
AQ-2510-0007	AQ - Mission Operations Anomaly Reporting and Tracking Process
AQ-336-0522	AQ - Aquarius Ground System - Aquarius Instrument Team Anomaly ICD
AQ-315-0110	AQ - Instrument Calibration Plan
AQ-316-0478	AQ - Aquarius Validation Data System (AVDS) ICD
AQ-417-0521	AQ - Aquarius Command & Control Segment Operations Handbook
AQ-316-0157	AQ - Aquarius Flight Operations Plan

1. Introduction

The Aquarius science data collected from the Aquarius/SAC-D spacecraft must be processed into data products by the Aquarius Ground Segment in accordance with the direction provided by the Principal Investigator (PI) and the PI Team.

The Aquarius Ground System (AQ GS) performs science data processing, archive, and distribution; and instrument mission operations. The AQ GS team implements the directives of the PI pertinent to these tasks.

The PI Team consists of the PI, the algorithm development team, and the science team. The science team is a multi-faceted group that identifies ancillary, validation, and auxiliary data sets and data sources; analyzes science data and directs updates to the science data processing, the Aquarius instrument code, or its operation accordingly; and supports Aquarius anomaly analysis and resolution.

1.1. Purpose and Scope

This Interface Control Document describes the interfaces and data exchanges between the Aquarius Principal Investigator Team and the Aquarius Ground Segment needed to process Aquarius science data. It describes the information required by the Aquarius Ground Segment from the Aquarius Principal Investigator Team to perform science planning and processing, obtain validation data, and update the operational behavior of the Aquarius instrument. It is separated into four primary categories:

1. Algorithm development
    a. Pre-launch planning and testing for initial processing
    b. Post-launch updates for re-processing
2. Ancillary Data Sets
    a. Data Types
    b. Data Sources

      c. Data quality assessment
3. Validation Data System
      a. Data types
      b. Data sources
      c. Data distribution
4. Science Planning
      a. Anomaly resolution
      b. Updates to nominal Aquarius configuration for science needs

1.2. Background

The Aquarius/SAC-D mission is designed to provide global Sea Surface Salinity maps by measuring the brightness temperature of the sea surfaces at L-band (1413 MHz) and using ancillary data to obtain Sea Surface Temperature. The Aquarius instrument consists of three L-band Radiometers and an L-band Scatterometer (radar) operating at 1260 MHz. The Scatterometer is employed to provide a correction for sea surface roughness, a primary component of the Aquarius error budget.

The SAC-D Service Platform is being built by CONAE, the Argentine government's space agency, in conjunction with INVAP, a commercial Argentine space company. SAC-D is also hosting several other science instruments that will support Argentine-sponsored science projects.

The Radiometer electronics portion of the Aquarius instrument is being built at GSFC; the Scatterometer at JPL. Aquarius data processing and instrument operations are also GSFC responsibilities. Mission Operations will be performed jointly by GSFC and CONAE.

1.3. Organization

The Aquarius Principal Investigator and the Aquarius Data Processing Manager are jointly responsible for establishing these interfaces under the control of the JPL Aquarius Project Office.

2. Operations Concept

The Aquarius Ground System Team is responsible for on-orbit operation and science data processing of the Aquarius instrument. The data and interfaces that must be defined by the Aquarius Ground System Team and the AQ Principal Investigator Team to fulfill these roles include:

1. Defining the interfaces and data exchanges between the AQ Ground System and the Data Processing Algorithm developers.

2. Defining the interfaces and data sources that apply to the Aquarius Validation Data Segment at both the Principal Investigator's facility and the AQ Ground System facility at GSFC.

3. Defining the interfaces and data exchanges between the AQ Ground System Team and the Aquarius Science Team for science planning. This includes routine (weekly) status reports to the science team.

4. Defining the interfaces and data exchanges between the AQ Ground System Team and the Aquarius Science Team for anomaly resolution.

3. Data and Information Exchanged

The AQ GS Data Processing System requires inputs from several sources in order to process Aquarius science data in accordance with the Principal Investigator's direction. Data is processed in Levels with each Level utilizing the specific interfaces, data sets, and code it requires for its portion of the production. The production Level specifications that pertain to interfaces with the Principal Investigator's team or sources defined by the Principal Investigator are described within the relevant sections of this document.

The Level definitions are defined here:

- Level 0 - Raw, unprocessed data, packaged in files as received from the CONAE Ground System.

- Level 1 – Reconstructed instrument data at full resolution.

  o Level 1a - Reconstructed unprocessed (reversible) instrument data at full resolution, time-referenced and annotated with ancillary information, including geo-referencing parameters (orbit and attitude) computed and appended, but not applied to the Level 0 data.

  o Level 1b - Level 1a data that have been processed to sensor units (Th, Tv, T+45, T-45, Shh, Svv, Svh, Shv) from the sensor calibration equations (top of atmosphere), with viewed locations and sensor angles computed and appended. Sensor output averaged to 1.44 sec. (The Level 1b data will be included in the Level 2 product.)

- Level 2 - Derived geophysical variables at the sensor resolution. Specifically:

  o Level 2a - Atmospherically corrected surface brightness temperatures from the radiometer; derived roughness corrections for Th and Tv; at the same resolution and location as Level 1 averaged data.

o Level 2b - Derived SSS at the same resolution and location as Level 1 averaged data, after applying on-orbit calibration.

o Intermediate products: At the same resolution and location, all radiometer and radar correction fields for external (cosmic, galactic), propagation (atmosphere, ionosphere Faraday, liquid water attenuation) and flags (solar flare, liquid, RFI), and surface (SST, surface wind direction and wave spectra, and ancillary winds from operational models, operational satellites and MARIA Level 1a data).

- Level 3 - Variables mapped on uniform space-time grid scales. Specifically:

  o Level 3a - Gridded SSS every 7 days using a 150 km x 150 km spatial averaging resolution and interpolated to a 1x1 lat/lon grid.

  o Level 3b - Objectively analyzed blended Level 2b and in situ SSS measurements at the same resolution and sample interval as Level 3a.

3.1. Algorithm Development

The PI Team is responsible for delivering the algorithms that will be utilized by the AQ GS Data Processing System to process:

- Level 1A to Level 1B
  o Top of the Atmosphere brightness temperature (Radiometer) + normalized radar cross-section (Scatterometer data)
- Level 1B to Level 2A
  o Surface brightness temperatures with atmospheric corrections
- Level 2A to Level 2B
  o Additional corrections of Sea Surface Temperature and roughness

The PI will provide the following to AQ GS:

- Product contents. Examples:
  o Brightness temperatures
  o Roughness correction
  o Sea Surface Temperature
  o Sea Surface Salinity (multiple sub-products)
- Algorithm code.
  o The PI team may deliver code in either their preferred high-level language (i.e., Matlab, Fortran, IDL) or pseudo-code. Pseudo-code is the form preferred by the AQ GS team.
  o Algorithm code is to be documented by the PI team and delivered to the AQ GS team.

- o Algorithms are to be evaluated and updated based on the PI Team's review of the science products. Final products are to be Quality Controlled via automated indicators provided to AQ GS by the PI Science Team.

The AQ GS will provide final versions of all source code after it has been implemented into the operational processing software. The GS will also provide the following products and intermediate products for PI team analysis and review:

- Level 2A intermediate products
- Level 2B intermediate products
- Level 3 products

For each product, AQ GS will provide the ancillary input per file separately so that the corrections are known.

3.2. Ancillary Data Sets

Ancillary data is data not created directly by the instrument, but is data collected from external sources and used to correct or geo-locate instrument measurements. With respect to ancillary data sets, the PI Team is responsible for:

- Identifying all ancillary data sets
- Identifying where each ancillary data set resides
- Describing how each ancillary data set is to be retrieved
    - o Retrieval schedule or frequency
    - o Required accounts for access
    - o Transfer process
- Providing rules to describe data
    - o Quality
    - o Priority
- Providing the assessment of how the ancillary data factors into the science products

 The AQ GS is responsible for the routine acquisition of the ancillary data sets defined by the PI team, for developing any pre-processing or reformatting software, and for making the data sets available to the PI Team on the GS web site.

3.3. Aquarius Validation Data Segment

The interfaces for performing Aquarius Validation are described in the Aquarius Ground System Document AQ-316-0478, Aquarius Ground System to Aquarius Validation Data System ICD.

3.4. Science Planning

The information to be exchanged between the Science and Mission Operations teams under nominal and anomalous conditions determines the types of interfaces required to complete those exchanges.

3.4.1. Routine Status Reports

The Aquarius Mission Operations team monitors instrument health, performs command scheduling, and provides initial diagnosis in the event of a ground system or instrument problem. In this role, the Mission Operations team will provide routine weekly status reports to the science team, possibly including references to online telemetry graphs (URL links).

3.4.2. Science Configuration Change Requests

The Science Team may wish to alter the operational configuration of Aquarius to improve science data quality or quantity. Possible activities include: Adjusting temperature setpoints; commanding off a portion of the instrument; operating the radiometer under a different Look Up Table. For these special operations, the Science Team must notify Mission Operations of its intent to change the instrument's configuration, specify the new configuration, gather a team to support the procedure development to make the changes, coordinate with the science and management teams of the Observatory, review and approve the proposed procedure.

The Mission Operations team must acknowledge reception of the Science Team's request, notify SAC-D Flight Operations to begin ground support coordination, work with the selected team to develop and test the desired procedure, forward the proposed procedure to the Science Team for approval, forward the approved procedure to CONAE for their testing purposes, plan the procedure execution, then monitor and report the procedure's status to the Science Team.

3.4.3. Cold Sky Calibration Requests

The Science Team is responsible for requesting Cold Sky Calibration events. The Science Team selects the Cold Sky Calibration target and places the request with Aquarius Mission Operations to perform the Cold Sky Calibration maneuver.

Aquarius Mission Operations re-runs the targeting data to verify the reasonableness of the request; forwards the Cold Sky Calibration maneuver request to CONAE via their Scheduler; and provides the targeting information (UTC date/time the instrument antenna should be pointing directly anti-Nadir) within the request. Once planned, Aquarius Mission Operations tracks the progress of the calibration maneuver and provides status reports to the Science Team.

3.4.4. Anomaly Resource Coordination

The Aquarius anomaly resolution procedure is described in the Aquarius document, "Aquarius Flight Anomaly Resolution Procedure". At a high level, the procedure states that any anomaly on the Aquarius/SAC-D Observatory is resolved under the leadership of the CONAE Mission Operations Manager under the authority of the Science Operations Control Board. The Aquarius anomaly resolution procedure is an offshoot of the CONAE procedure in which the Aquarius Mission Operations Lead serves as the Aquarius Mission Operations Manager. The Aquarius and CONAE Operations Managers then coordinate action plans together, notifying and gathering the appropriate personnel required to diagnose, resolve, approve, and implement restoration to service.

The Aquarius anomaly resolution procedure assumes that either the CONAE flight operations team or the Aquarius flight operation team may observe an Aquarius anomaly. In that event, either party is to file a Flight Anomaly Report and transmit it to the CONAE Mission Operations Manager. The CONAE Mission Operations Manager then contacts any CONAE technical and management support required; the Aquarius Mission Operations Lead contacts Aquarius management support. The Aquarius management support includes the JPL liaison who contacts the technical support required from the JPL and GSFC instrument team.

From this point, the instrument team, the Aquarius Mission Operations Lead, and the CONAE Mission Operations Manager must transfer information amongst each other in various forms in order to diagnose the anomaly, discuss and select a resolution, obtain approval, and implement the resolution selected.

The Aquarius Mission Operations Lead needs to follow the diagnosis process, consider and provide other pertinent information, encapsulate information into progress reports and disseminate them to Aquarius management which includes members of the science team.

4. Interfaces and Formats

The Aquarius Ground System to Science Team interfaces rely on the Aquarius Reporting and Tracking Tool as the mechanism to support active and archived communications between groups. Each participant in the interactions listed in sections 4.4 must also become a subscriber to the Aquarius Reporting and Tracking Tool (ARTT). The ARTT will automatically email subscribers when new Tickets are entered so participants must provide a reliable email address in order to receive the various notifications shown below.

"Tickets" include (but are not limited to):
- Algorithm source code delivered from the Science Team
- Requests from the Science Team to change ancillary data sources
- Requests from the Science Team to update Aquarius science algorithms

- Requests from the Science Team to change the configuration of the instrument
- Requests from the Science Team to perform a Cold Sky Calibration maneuver
- Anomaly reports

Potential subscribers will include team members from Aquarius science, instrument, CONAE/SAC-D mission operations and management, and Aquarius mission operations and management.

Required subscribers and their email addresses are:

Gary Lagerloef _____ lager@esr.org
David LeVine _____ david.m.levine@nasa.gov
Yi Chao _____yi.chao@jpl.nasa.gov
Gene Feldman _____gene.c.feldman@nasa.gov
Fred Patt _____ frederick.s.patt@nasa.gov
Daniel Caruso _____caruso@conae.gov.ar
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Liang Hong _____ liang@seawifs.gsfc.nasa.gov
Susan Kennison _____susan.l.kennison@nasa.gov

To obtain an account, contact the deputy Aquarius Ground System Manager, Fred Patt:
Frederick.S.Patt@nasa.gov

The URL for accessing the Aquarius Reporting and Tracking Tool is:

http://aquarius.gsfc.nasa.gov/AQOPS/

The URL for accessing the Aquarius Reporting and Tracking Tool tutorial is:

http://aquarius.gsfc.nasa.gov/AQOPS/wiki/TracGuide

4.1. Algorithm Development

Algorithm Theoretical Basis Documents contain the algorithm descriptions for the science data processing.

All source code files will be delivered in the form of TAR files via the Aquarius Reporting and Tracking Tool (ARTT) as one or more attachments. ARTT automatically reports deliveries to selected recipients. The submitted source code is then placed in the test environment, run against test cases, with sample products made available.

The Aquarius Ground System approach to software development will follow a rapid development and delivery model. The critical factor in maintaining software integrity in

a dynamic development environment is knowledgeable staff who can understand the algorithm or proposed modifications, and therefore predict the result. In that way, implementation errors can be quickly identified during the initial phase of development and unit testing. The GS Team will not treat any algorithm as a "black box".

When a new algorithm is provided in the form of an ATBD or similar publication, the GS Team will code the algorithm into a well structure module written in the C language. Quality tests will also be included to indicate cases where the algorithm failed or where the results may be suspect. The quality tests will be used to set flags in the Level-2 products, which can then be used to mask bad retrievals during Level-3 processing. If such tests are not fully described in the ATBD, the GS Team will work with the algorithm author to develop them.

When a new product algorithm is provided as working code, the GS Team will assess the quality of the implementation to determine if a rewrite is necessary. For complex algorithms where the algorithm author is still actively developing the methodology, we will simply provide a C wrapper function. Once a C wrapper is developed, implementation will proceed as described earlier.

In either case, the new code will be unit tested to verify functionality. The source will then be distributed to the algorithm author and knowledgeable staff for review, and any necessary changes will be made. A test plan will be request from the algorithm author, or developed by the GS Team. The algorithm will be evaluated on the test images, and results will be distributed via the Ocean Color Web to the author, NASA leads, and project staff for review. The development and test process will iterate until all parties are satisfied with the results.

Following any change to the operational software, the first step in maintaining software integrity is to regression test, and thereby ensure that no unexpected alteration of the operational products will occur. The GS Team will maintain a set of standard Level-0 and associated Level-1, Level-2, and Level-3 products for all operationally supported missions and product suites. By regenerating the standard products for each software change, and comparing the newly generated products to the previous operational set, the regression test verifies that products are not inadvertently altered. Regression testing will also be performed to verify consistency between operating system (OS) changes.

Following regression testing, the new executable and any associated static data files will be delivered to the data processing system. The software test team will then verify through visual inspection of processing recipes and analysis of operationally generated Level-2 products, that the modified executables, data files, and run-time parameters have been correctly transferred from the software development environment to the production processing system.

To verify that Level-3 masking conditions are correctly implemented, and to document changes on global spatial scales and life-of-mission time-scales, the GS Team will

provide a global mission test plan to the data processing group and NASA leads. The mission test will provide long-term global and regional temporal trends in derived products, to assess changes between full mission reprocessings and to provide feedback to the instrument calibration element regarding temporal and spatial stability assessments.

4.2. Aquarius Validation Data Segment

The interfaces for performing Aquarius Validation are described in the Aquarius Ground System Document AQ-316-0478, Aquarius Ground System to Aquarius Validation Data System ICD.

4.3. Science Planning

The following sections describe the interfaces between the science team and the elements of the Aquarius ground system that are responsible for Aquarius mission operations.

The activities include: the weekly state of health status reports that the mission operations team provides to the science team; requests by the science team to perform Cold Sky Calibration maneuvers or changes to the instrument configuration; and interactions between science and mission operations for resolving anomalies.

4.3.1. Routine Status Reports

The information that the Aquarius Mission Operations team provides to the Aquarius Science team for routine weekly status reports includes:

- Out of limits conditions observed
  - Nominal if no out of limits
- Changes in trends (with URL to pertinent Aquarius on-line graphs)
- Upcoming command, maneuver events
- Upcoming space environment events (solar storms, eclipses)

Aquarius Weekly Status Report		
Date From: DD/MM/YY	Date To: DD/MM/YY	
Out of Limits	Date/Time (or "NONE")	Mnemonic/Alarm Level
	Date/Time	Mnemonic/Alarm Level
	Date/Time	Mnemonic/Alarm Level
New trend	Mnemonic	URL to graph
	Mnemonic	URL to graph
Upcoming command events	Date/Time	Description
	Date/Time	Description

| Upcoming space environment events | Date/Time | Description |

Table 4.3.1.1 Aquarius Weekly Status Report format.

The specific interfaces for each type of information to be exchanged are listed in Table 4.3.1.2.

Exchanged Information	Interface	Description
Status Reports/Data	MO_SR_ARTT_D MO_SR_graphs	Aquarius Reporting and Tracking Tool, Ocean Biology web-based graphs

Table 4.3.1.2 Aquarius Mission Operations team to Aquarius Science team routine status report interface.

The Aquarius Weekly Status Reports will be available in reverse chronological order (most recent first) in the Wiki portion of the Aquarius Reporting and Tracking Tool:

http://oceancolor.gsfc.nasa.gov/AQUARIUS/TRAC/Wiki

and the Ocean Biology web-based graphs are located here:

http://oceancolor.gsfc.nasa.gov/AQUARIUS/MissionOps/graphs

4.3.2. Science Configuration Change Requests

The information that the Aquarius science team provides to the Aquarius Mission Operations team for science configuration change requests includes:

- Notification of intent to change instrument configuration
- Description of the new configuration
- Approved support team for procedure development
- Notification of successful coordination with CONAE management
- Request AQ GS to coordinate with CONAE ground system and operations
- Notification that proposed implementation plan is under Science Control Board review.
- Notification of Science Control Board plan approval
- Science verification of the success of the procedure

The information that the Aquarius Mission Operations team provides to the Aquarius Science team for science configuration change requests includes:

- Acknowledgement of intent to change configuration
- Notification of successful coordination with CONAE GS and operations

- Proposed command plan
- Request for Science Control Board approval of plan
- Notification of date of implementation
- Notification of completion of implementation
  - Includes telemetry verification of commands

The specific interfaces for each type of information to be exchanged are listed in Tables 4.3.2.1 and 4.3.2.2.

Exchanged Information	Interface	Description
Initial Configuration Change Request	MO_S_ARTT_CCR	Aquarius Reporting and Tracking Tool entry
Approved Support	MO_S_ARTT_S	Aquarius Reporting and Tracking Tool entry
CONAE Management Coordinated	MO_S_ARTT_CMC	Aquarius Reporting and Tracking Tool, Ocean Biology web-based graphs
Request to Coordinate with CONAE GS and Operations	MO_S_ARTT_RGSC	Aquarius Reporting and Tracking Tool entry or attachment
Notification: Proposed Operations Procedures under SOCB review	MO_S_ARTT_NPR	Aquarius Reporting and Tracking Tool entry or attachment
Notification: Procedures Approved by SOCB	MO_S_ARTT_NPA	Aquarius Reporting and Tracking Tool entry
Notification of science verification of configuration change	MO_S_ARTT_NSV	Aquarius Reporting and Tracking Tool entry.

Table 4.3.2.1 Aquarius Science Team to Mission Operations team configuration change request interfaces.

Exchanged Information	Interface	Description
Acknowledgement of Opened Anomaly Report	MO_S_ARTT_ACK	Aquarius Reporting and Tracking Tool entry
Notification of Successful CONAE GS Coordination	MO_S_ARTT_NGSC	Aquarius Reporting and Tracking Tool entry
Proposed Special Operations Plan	MO_S_ARTT_PSOP	Aquarius Reporting and Tracking Tool entry
Request for Approval of Special Operations Plan	MO_S_ARTT_RSOPA	Aquarius Reporting and Tracking Tool entry
Planned Implementation Date	MO_S_ARTT_PDSOP	Aquarius Reporting and Tracking Tool entry
Notification of completed	MO_S_ARTT_CSOP	Aquarius Reporting and

implementation		Tracking Tool entry

Table 4.3.2.2 Aquarius Mission Operations team to Aquarius Science team configuration change request interfaces.

The Aquarius Reporting and Tracking Tool is accessed via this URL:

http://oceancolor.gsfc.nasa.gov/AQUARIUS/TRAC/

4.3.3. Cold Sky Calibration Requests

The information that the Science team provides to Mission Operations for Cold Sky Calibration requests includes:

- Cold Sky Calibration maneuver request specifying:
  - o Pitch angle: 90-180 degrees (TBC)
  - o Dwell time 1 – 10 minutes (TBC)
  - o Time/date (of arrival at max rotation).
- Time requests are of 1 second resolution (TBC)
- Request is to be made at least 21 days in advance of the target date

The information that the Aquarius Mission Operations team provides to the Aquarius Science team for Cold Sky Calibration requests includes:

- Verification of the targeting data
  - o Verification means the desired target matches the simulated target
- Notification that CONAE has initiated maneuver scheduling
- Notification that CONAE has finalized maneuver scheduling
- Notification that the maneuver has been completed
- Notifications will include descriptions of any non-nominal events
  - o If appropriate, it will point to an opened anomaly report

The specific interfaces for each type of information to be exchanged are listed in Tables 4.3.3.1 and 4.3.3.2.

Exchanged Information	Interface	Description
Cold Sky Calibration Request	MO_S_ARTT_CSCR	Aquarius Reporting and Tracking Tool entry

Table 4.3.3.1 Aquarius Science team Mission Operations team to Aquarius Mission Operations team Cold Sky Calibration interfaces.

Exchanged Information	Interface	Description
Verification of Target	MO_S_ARTT_CSCTV	Aquarius Reporting and

		Tracking Tool entry
Notification of CONAE Scheduling initiation	MO_S_ARTT_CSCSI	Aquarius Reporting and Tracking Tool entry
Notification of Finalized Scheduling	MO_S_ARTT_CSCSF	Aquarius Reporting and Tracking Tool entry
Notification of Completed Maneuver	MO_S_ARTT_CSCFM	Aquarius Reporting and Tracking Tool entry
Notification of Non-Nominal event	MO_S_ARTT_CSCNN	Aquarius Reporting and Tracking Tool entry

Table 4.3.3.2 Aquarius Science anomaly resolution team to Aquarius Mission Operations team Cold Sky Calibration interfaces.

The Aquarius Reporting and Tracking Tool is accessed via this URL:

http://aquarius.gsfc.nasa.gov/AQOPS/

4.3.4. Anomaly Resource Coordination

The information that the Aquarius Mission Operations team provides to the Aquarius Science team in the event of an anomaly includes:

- The initial Flight Anomaly Report
- Recommended resolution team members
- Anomaly resolution status reports
- Command upload opportunities (date/time/duration)
- Proposed Operations plans and procedures
- Request for Science Control Board plan approval
- The final (closed) Flight Anomaly Report

The information that the Aquarius science team provides to the Aquarius Mission Operations team for Cold Sky Calibration requests includes:

- Acknowledgment of the initial anomaly report
- Approved resolution team members
- Requests for additional information
- Notification that plan approval is underway via the Science Operations Control Board
- Notification of Science Control Board plan approval

The Flight Anomaly Report Form is shown in FORM 4.3.4.1

FLIGHT ANOMALY REPORT

PROJECT:		FAR LOG #:	
FAR TITLE:		STATUS:	
DATE:	TIME:	DATE CLOSED:	
FACILITY	RELATED PROBLEM PFR LOG # (If Applicable):	○ FLIGHT HDW ○ FLIGHT STW ○ GROUND SYSTEM ○ COMMAND FILE ERROR	
ORIGINATOR	ORGANIZATION	○ OTHER	

ANOMALY DESCRIPTION

Description of Anomaly or Problem

Problem / Failure Noted During:

Anomaly recurrence: Yes No	If yes FAR #:

INITIAL CRITICALITY ASSESMENT:	○ 1 ○ 2 ○ 3 ○ 4

FAILURE VERIFICATION & ANALYSIS

Resolution Team Members /organizations	

Verification and Analysis	Assigned to:

Cause of Problem / Failure:

FINAL CRITICALITY ASSESMENT:　　　⭕ 1　　⭕ 2　　⭕ 3　　⭕ 4

RISK CODES & RATINGS	
FAILURE EFFECT RATING	⭕ 1　　⭕ 2　　⭕ 3
FAILURE CAUSE CORRECTION ACTION RATING	⭕ 1　　⭕ 2　　⭕ 3　　⭕ 4

CORRECTIVE / MITIGATION ACTION	
Corrective Action Taken	**Assigned to:**

CORRECTIVE / MITIGATION ACTION RESULTS

RESIDUAL RISK / MISSION DEGRADATION

CLOSING SIGNATURES (SAFARB USE ONLY)			
NAME	**POSITION & ORGANIZATION**	**SIGNATURE**	**DATE**

Table 4.3.4.1 Aquarius – SACD Flight Anomaly Report Form.

The specific interfaces for each type of information to be exchanged are listed in Tables 4.3.4.2 and 4.3.4.3.

Exchanged Information	Interface	Description
Initial Flight Anomaly Report	MO_S_ARTT_N	Aquarius Reporting and Tracking Tool entry/attachment
Request for Support	MO_S_ARTT_S	Aquarius Reporting and Tracking Tool entry
Status Reports/Data	MO_S_ARTT_D MO_S_graphs	Aquarius Reporting and Tracking Tool, Ocean Biology web-based graphs
Pass Times/Durations	MO_S_ARTT_Pass	Aquarius Reporting and Tracking Tool entry or attachment
Proposed Operations Procedures	MO_S_ARTT_Proc	Aquarius Reporting and Tracking Tool entry or attachment
Request for Approval	MO_S_ARTT_RA	Aquarius Reporting and Tracking Tool entry
Final Flight Anomaly Report	MO_S_ARTT_F	Aquarius Reporting and Tracking Tool entry/attachment

Table 4.3.4.2 Aquarius Mission Operations team to Aquarius Science anomaly resolution team interfaces.

Exchanged Information	Interface	Description

Acknowledgement of Opened Anomaly Report	MO_S_ARTT_ACK	Aquarius Reporting and Tracking Tool entry
Notification of Support	MO_S_ARTT_NS	Aquarius Reporting and Tracking Tool entry
Notification of Approval	MO_S_ARTT_NA	Aquarius Reporting and Tracking Tool entry

Table 4.3.4.3 Aquarius Science anomaly resolution team to Aquarius Mission Operations team interfaces.

GLOSSARY

AQ GS	Aquarius Ground System
CONAE	Comision Nationale Argentina Espaciale
GSFC	Goddard Space Flight Center
JPL	Jet Propulsion Laboratory
MOC	Mission Control Center
PI	Principal Investigator
SSS	Sea Surface Salinity
SST	Sea Surface Temperature